

TRANSMITTER CIRCUIT, ARTICLE OF MANUFACTURE, AND
METHOD OF TRANSMITTING

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a transmitter circuit, article of manufacture, and method of transmitting utilizing a surface acoustic wave (SAW) resonator as a frequency control element in an oscillator.

2. Background Art

10 A surface acoustic wave (SAW) includes coupled compressional and shear waves. The SAW energy is near the surface. SAW resonators may be used as frequency control elements in oscillators. SAW stabilized oscillators have been used in the past to form SAW stabilized transmitters.

15 In an existing SAW stabilized transmitter, a data signal is used to turn the SAW stabilized oscillator on and off to create a sequence of radio frequency bursts. The sequence of radio frequency bursts passes through an amplifier and is transmitted with an antenna. The SAW stabilized oscillator of the SAW stabilized transmitter takes a certain amount of time to turn on. As such, the maximum data rate for the data signal is dependent on the amount of time that it takes to turn on the SAW stabilized oscillator because the oscillator is turned on and off to create the
20 sequence of radio frequency bursts.

Some existing patents relating to signals and systems include U.S. Patent Nos. 2,312,810; 3,648,186; 3,706,038; 4,661,819; 4,684,853; 5,146,613; 5,793,261; and 5,920,234. U.S. Patent No. 2,312,810 describes a signal generator for producing an audio frequency wave that is interrupted or chopped up into
25 characters. U.S. Patent No. 3,648,186 describes a signal amplification unit in which a pulse width modulated signal is employed to key a radio frequency carrier

5 wave. U.S. Patent No. 3,706,038 describes a pulse transmitter including means for controlling the amplitude and phase of output pulses. U.S. Patent No. 4,661,819 describes a doppler tolerant binary phase coded pulse compression system. U.S. Patent No. 4,684,853 describes a garage door opener using a transmitter with a SAW resonator. U.S. Patent No. 5,146,613 describes a low power ultra high frequency data transceiver. U.S. Patent No. 5,793,261 describes a SAW stabilized frequency shift keying oscillator circuit. U.S. Patent No. 5,920,234 describes a buffered oscillator transmitter arrangement for power specific applications having parasitic impedances.

10 For the foregoing reasons, there is a need for an improved transmitter circuit that allows for greater data rates in a SAW stabilized transmitter.

SUMMARY OF THE INVENTION

15 It is, therefore, an object of the present invention to provide a transmitter circuit including a SAW stabilized oscillator circuit and an amplifier circuit wherein the amplifier circuit modulates a carrier signal produced by the SAW oscillator with a data signal.

20 In carrying out the above object, a transmitter circuit is provided. The transmitter circuit comprises an oscillator circuit and an amplifier circuit. The oscillator circuit includes a surface acoustic wave (SAW) resonator. The oscillator circuit generates a carrier signal. The amplifier circuit receives the carrier signal and receives a data signal. The amplifier circuit generates an output signal as the carrier signal modulated with the data signal.

25 In a suitable implementation, the transmitter circuit further comprises an antenna and control logic. The antenna is coupled to the amplifier circuit to transmit the output signal. The control logic is configured to generate the data signal. The control logic may be, for example, a microprocessor. Preferably, the transmitter circuit further includes an assertable switch connected to the control logic. The control logic is configured such that assertion of the switch causes the

control logic to generate the data signal. In a suitable implementation, the oscillator circuit further comprises a bipolar junction transistor, and the amplifier circuit further comprises a bipolar junction transistor. Alternatively, devices such as field effect transistors, or any other active devices that can provide gain at the desired frequency may be used. Preferably, the carrier signal has a frequency of at least 300 MHz.

Further, in carrying out the present invention, an article of manufacture is provided. The article of manufacture comprises a housing, at least one circuit board, an oscillator circuit, and an amplifier circuit. The oscillator circuit is on the at least one circuit board. The oscillator circuit includes a surface acoustic wave (SAW) resonator. The oscillator circuit generates a carrier signal. The amplifier circuit in on the at least one circuit board. The amplifier circuit receives the carrier signal and receives a data signal. The amplifier circuit generates an output signal as the carrier signal modulated with the data signal.

Still further, in carrying out the present invention, a method of transmitting is provided. The method comprises generating a carrier signal with an oscillator circuit including a surface acoustic wave (SAW) resonator. The method further comprises generating a data signal, generating an output signal, and transmitting the output signal. The output signal is generated with an amplifier circuit receiving the carrier signal and receiving the data signal. The amplifier circuit generates the output signal as the carrier signal modulated with the data signal.

The advantages associated with embodiments of the present invention are numerous. For example, embodiments of the present invention extend the maximum data rate for SAW stabilized transmitters by utilizing an amplifier circuit to generate an output signal as the carrier signal modulated with the data signal. Advantageously, the SAW stabilized oscillator continuously produces the carrier signal, while the data signal modulates the carrier signal at the amplifier circuit.